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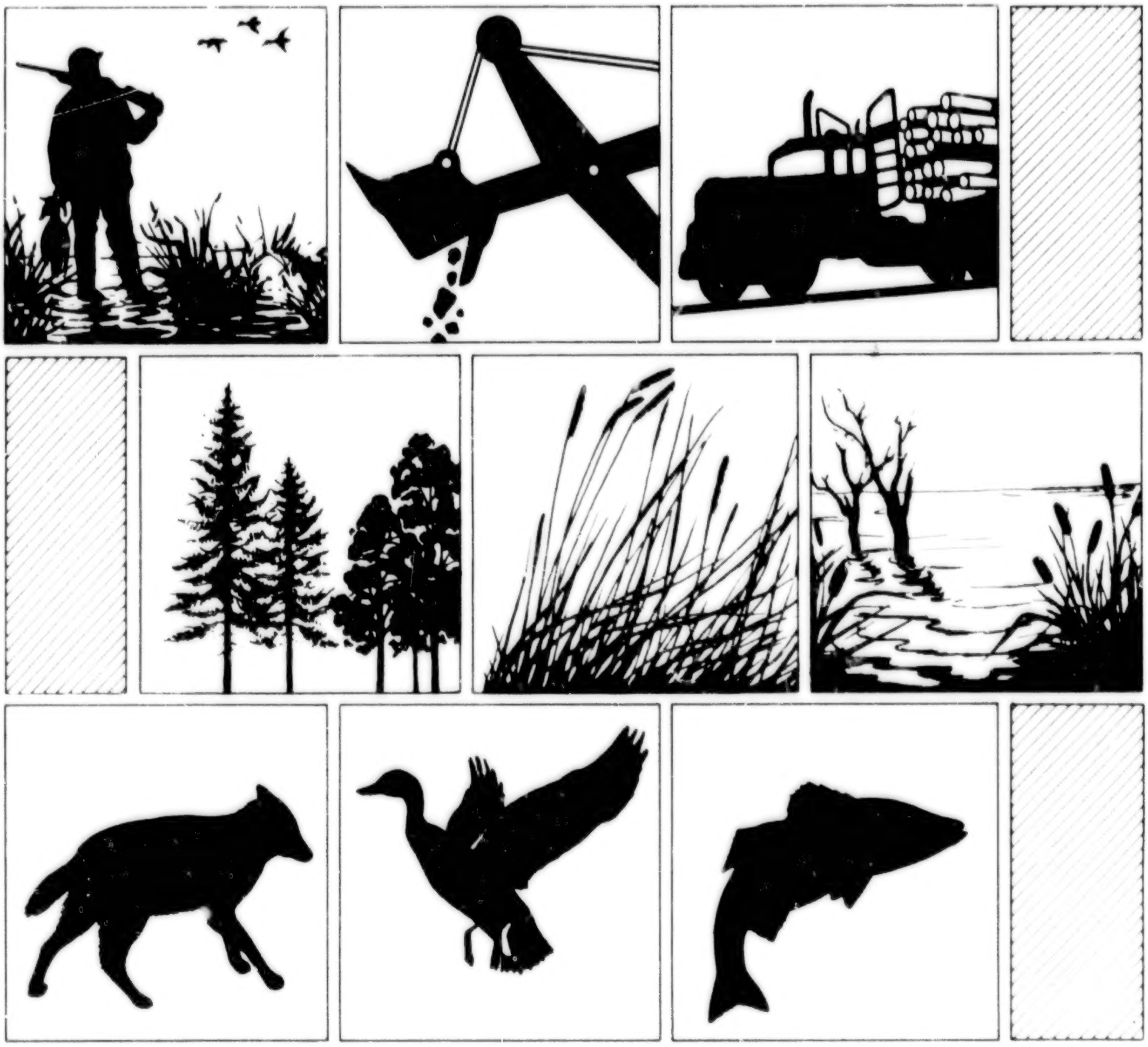
PROBLEM ANALYSIS AND PLANNING FOR THE FWS CUMULATIVE IMPACTS PROGRAM: AUGUST 1984 WORKSHOP PROCEEDINGS



Fish and Wildlife Service

U.S. Department of the Interior

This is one of the first reports to be published in the new "Biological Report" series. This technical report series, published by the Research and Development branch of the U.S. Fish and Wildlife Service, replaces the "FWS/OBS" series published from 1976 to September 1984. The Biological Report series is designed for the rapid publication of reports with an application orientation, and it continues the focus of the FWS/OBS series on resource management issues and fish and wildlife needs.

Biological Report 85(11.1)
June 1985

PROBLEM ANALYSIS AND PLANNING FOR THE FWS CUMULATIVE IMPACTS PROGRAM: AUGUST 1984 WORKSHOP PROCEEDINGS

by

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EXECUTIVE SUMMARY

The Associate Director for Habitat Resources has directed the Western Energy and Land Use Team (WELUT) to develop and evaluate potential actions that the Fish and Wildlife Service (FWS) could take to institute an effective cumulative impact (CI) assessment program. The approach for performing this work was divided into several phases. This document is a report on a phase one workshop, held August 28 to 30, 1984. Participants in the workshop represented FWS Regions 5 and 6, WELUT, two private consulting firms, and the academic community. Each participant was experienced in working with CI's and had expressed an interest in contributing to a holistic approach for CI assessment.

Some broad guiding principles for developing a CI assessment program were identified during the workshop. First, other agencies and institutions should be involved in developing CI assessment processes. Agencies that are involved in creating processes to assess resources under their jurisdiction are much more likely to participate collaboratively in future CI assessment implementations. Second, the CI assessment process can be developed most effectively through real world analysis of CI problems using prototype applications. Third, the CI assessment program should provide: (a) mechanisms for coalescing experience gained through specific CI assessment studies; (b) forums for collaboration among institutions; (c) training for people involved in CI assessment; and (d) a clearinghouse of methods for use in CI assessment.

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ACKNOWLEDGMENTS

Special acknowledgment is extended to Charles Peterson (Office of Personnel Management) for guiding the workshop. Methods for the workshop were adopted from the Participant's Manual for a course entitled "Workshop in Program Planning and Analysis" presented by the Denver Regional Training Center of the U.S. Office of Personnel Management.

Participants in the workshop were Richard Fisher (WELUT), Gerry Horak (Technicolor Government Services), Clark Johnson (Region 6 - Habitat Resources), William Knapp (Region 5 - Habitat Resources), Ivo Lindauer (University of Northern Colorado and Northwest Colorado Wildlife Consortium), Ron Osborn (WELUT), and Margaret Thomas (Midwest Research Institute). Spencer Amend assisted with coordination of activities for the workshop. Carolyn Gulzow and Dora Ibarra typed the report. Authors are listed alphabetically.

INTRODUCTION

Cumulative impacts (CI's) to environmental resources from private sector development and public sector resource management are an ongoing reality. A frequent consequence of the impacts is alteration of fish and wildife habitat affecting a few acres, several counties or States, or a major section of the Nation. Congress declared its concern for these consequences by enacting the National Environmental Policy Act (NEPA) in 1969 which recognized "the profound impacts of man's activity on the interrelationships of all components of the National Environment." NEPA was established to "promote effects which will prevent or eliminate damage to the environment." Concurrently with the passage of NEPA, the Council of Environmental Quality (CEQ) was formed to promote the provisions of the Act.

> The National Environmental Policy Act (NEPA) is our basic national charter for protection of the environment. It establishes policy, sets goals (section 101), and provides means (section 102) for carrying out the policy. Section 102(2) contains action-forcing provisions to make sure that federal agencies act according to the letter and spirit of the Act. The regulations that follow implement Section 102(2). Their purpose is to tell federal agencies what they must do to comply with the procedures and achieve the goals of the Act. The President, the federal agencies, and the courts share responsibility for enforcing the Act so as to achieve the substantive requirements of section 101 [40 C.F.R. Section 1500.1(a)].
>
> NEPA procedures must insure that environmental information is available to public officials and citizens before decisions are made and before actions are taken. The information must be of high quality. Accurate scientific analysis, expert agency comments, and public scrutiny are essential to implementing NEPA. Most important, NEPA documents must concentrate on the issues that are truly significant to the action in question, rather than amassing needless detail [40 C.F.R. Section 1500.1(b)].
>
> Ultimately, of course, it is not better documents but better decisions that count. NEPA's purpose is not to generate paperwork--even excellent paperwork--but to foster excellent action. The NEPA process is intended to help public officials make decisions that are based on understanding of environmental consequences, and take actions that protect, restore, and enhance the environment. These regulations provide the direction to achieve this purpose [40 C.F.R. Section 1500.1(c)].

Regulations published by the CEQ require the scope of an environmental impact study to include cumulative impacts.

> The statutory clause 'major Federal actions significantly affecting the quality of the human environment' is to be construed by agencies with a view to the overall, cumulative impact of the action proposed, related Federal actions and projects in the area, and further actions contemplated.... In considering what constitutes major action significantly affecting the environment, agencies should bear in mind that the effect of many Federal decisions about a project or complex of projects can be individually limited but cumulatively considerable. This can occur when one or more agencies over a period of years puts into a project individually minor but collectively major resources, when one decision involving a limited amount of money is a precedent for action in much larger cases or represents a decision in principle about a future major course of action, or when several Government agencies individually make decisions about partial aspects of a major action. In all such cases, an environmental statement should be prepared if it is reasonable to anticipate a cumulatively significant impact on the environment from Federal action (38 C.F.R. Sect. 1500.6) (emphasis added).

The CEQ defines cumulative impacts as:

> The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 C.F.R. Sect. 1508.7).

PROBLEM STATEMENT AND OVERALL OBJECTIVE

Cumulative impacts are occurring that have a significant adverse effect on fish and wildlife resources. Regardless of the CEQ's regulations and definition of CI, most environmental impact studies are site specific, underrepresent the actual area of influence, do not assess additive and synergistic effects, and ignore the combined effects of past, present, and foreseeable future actions. The FWS should provide leadership in conserving, protecting, and enhancing fish and wildlife resources for the benefit of the public, now and in the future. The Service has a responsibility to increase positive CI's on fish and wildlife and reduce negative CI's through impact assessment and mitigation.

WORKSHOP APPROACH

The complexity of CI problems substantiates the probability that CI assessment will not be a method or technique developed to apply in all cases. Instead, a process or procedure must be developed that can be applied to a range of CI problems, utilizing a wide range of methods and techniques. The problem solving process will need to consider objectives for CI assessment and mitigation, available data that can be used for analysis, data gaps, technology development needs, etc.

A core group was formed at WELUT to develop processes for evaluating cumulative impacts. The core group received problem analysis and planning assistance from FWS Regional Office and Field Office personnel, the academic community, and consulting firms. All of the individuals providing this assistance had professional expertise in CI assessment. Their input was obtained at a workshop designed to use methods taught in an Office of Personnel Management course on program planning and analysis. This report contains a brief description of the analytical approach used at the workshop (Appendix A), and workshop results as synthesized by the authors. During the workshop, the 10 participants were divided into two groups that performed the analyses. This report consolidates the information produced by these two groups.

RESULTS

Once an agreement was reached on the problem statement, overall problem causes were identified using a technique known as backstep analysis (Fig. 1). Thirty-one specific problem causes were described, then grouped into three categories (Figs. 2, 3, and 4).

Next, a diagramming technique known as the Functional Analysis System Technique (FAST) was applied to describe possible actions for a comprehensive approach to accomplish the overall objective, and six categories of actions were specified (Fig. 5). Fifty specific action items were assigned among the six categories (Figs. 6 to 11).

FUTURE PHASES

Cumulative impact problems are extremely variable and complex, and efforts undertaken to describe them must be flexible and comprehensive. Attempts to solve the problems must be viewed as adaptive processes or procedures rather than specific methods or techniques. However, processes or procedures are needed which identify problems, specify existing methods to solve them or prescribe new methods when existing ones are inadequate, and train problem solvers to use the most appropriate approaches to influence decisions on behalf of fish and wildlife resources.

Some broad, guiding principles for developing a CI assessment program are apparent. First, other agencies and institutions should be involved in developing CI assessment processes. Agencies that are involved in creating processes to assess resources under their jurisdiction are much more likely to participate collaboratively in future CI assessment implementations. Second, the CI assessment process can be developed most effectively through real world analysis of CI problems using prototype applications. Third, the CI assessment program should provide: (a) mechanisms for coalescing experience gained through specific CI assessment studies; (b) forums for collaboration among institutions; (c) training for people involved in CI assessment; and (d) a clearinghouse of methods for use in CI assessment.

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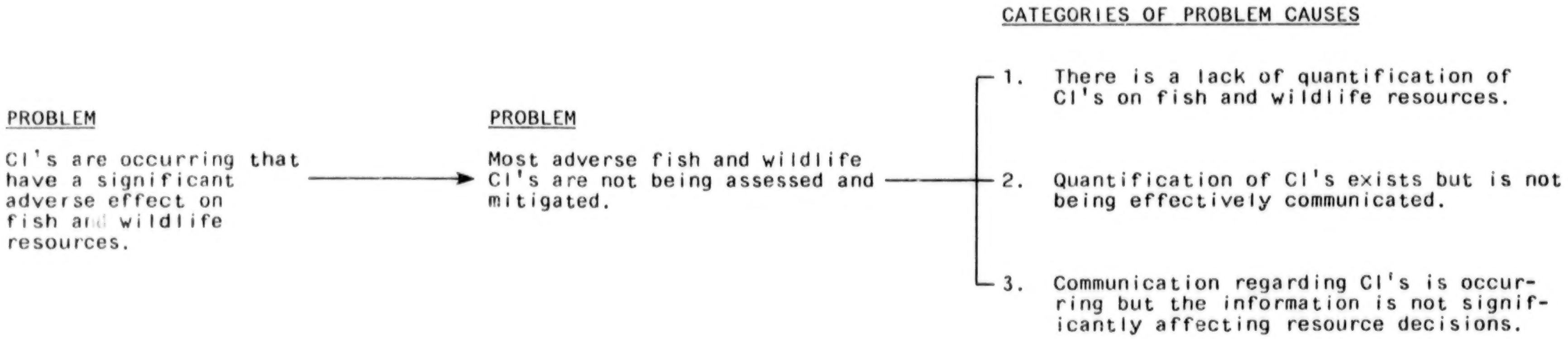


PROBLEM

CI's are occurring that have a significant adverse effect on fish and wildlife resources.

PROBLEM

Most adverse fish and wildlife CI's are not being assessed and mitigated.

CATEGORIES OF PROBLEM CAUSES

1. There is a lack of quantification of CI's on fish and wildlife resources.
2. Quantification of CI's exists but is not being effectively communicated.
3. Communication regarding CI's is occurring but the information is not significantly affecting resource decisions.

Figure 1. CI assessment problem statement and the three major categories of problem causes. The order of listing is not the order of priority.

CATEGORY 1 OF PROBLEM CAUSES

There is a lack of quantification of CI's on fish and wildlife resources.

- CI assessment is perceived as relatively costly, compared with individual project assessments.
  - Operational constraints (time, manpower, dollars, training, etc.) force choices that prevent or frustrate CI assessment.
  - Because legal and institutional requirements for assessing CI's are not clear, it is often considered to be a discretionary and low priority expenditure.
  - There is too much data to handle easily.
  - Critical data are missing or hard to obtain.
  - More resources will be required to develop CI assessment techniques and skills.
  - More resources will be required to use CI assessment on an operational basis.
  - The benefits of quantifying CI's are misunderstood or underestimated.
- There is a lack of agreement on which techniques to use and how to apply the techniques.
  - Proven methods for determining CI's are not available.
  - Potential CI assessment techniques are available, but the relative merits of the techniques are not understood or documented.
  - No single technique is adequate for all CI assessments.
  - A generic system for assessment is not available.
  - There is a general reluctance to use analytical tools for CI assessment because of loss of control and difficulty in application.
  - There is little confidence that technical determinations of CI's will have a meaningful effect on resource decisionmaking.
  - Current emphasis is on marketing and use of methods instead of problem solving.
  - There is no clearinghouse to identify and compare CI assessment tools and methods.

SPECIFIC PROBLEM CAUSES

Figure 2. Specific problem causes that comprise category 1 of problem causes. The order of listing is not the order of priority.

CATEGORY 2 OF PROBLEM CAUSES

Quantification of CI's exists but is not being communicated.

SPECIFIC PROBLEM CAUSES

- Communication and negotiation tools and skills are not being effectively utilized.
- There is a lack of opportunity for negotiation and collaboration among affected parties.
- Lack of knowledge of decision entry points hampers effective action.
- The units of measurement relevant to the decisionmaker are poorly understood and communicated.
- Identification and awareness of the appropriate decisionmaker audience for a CI assessment is lacking.
- Access to the target decisionmaker is severely limited or lacking.
- Public interest and the media are not being used effectively.

Figure 3. Specific problem causes that comprise category 2 of problem causes. The order of listing is not the order of priority.

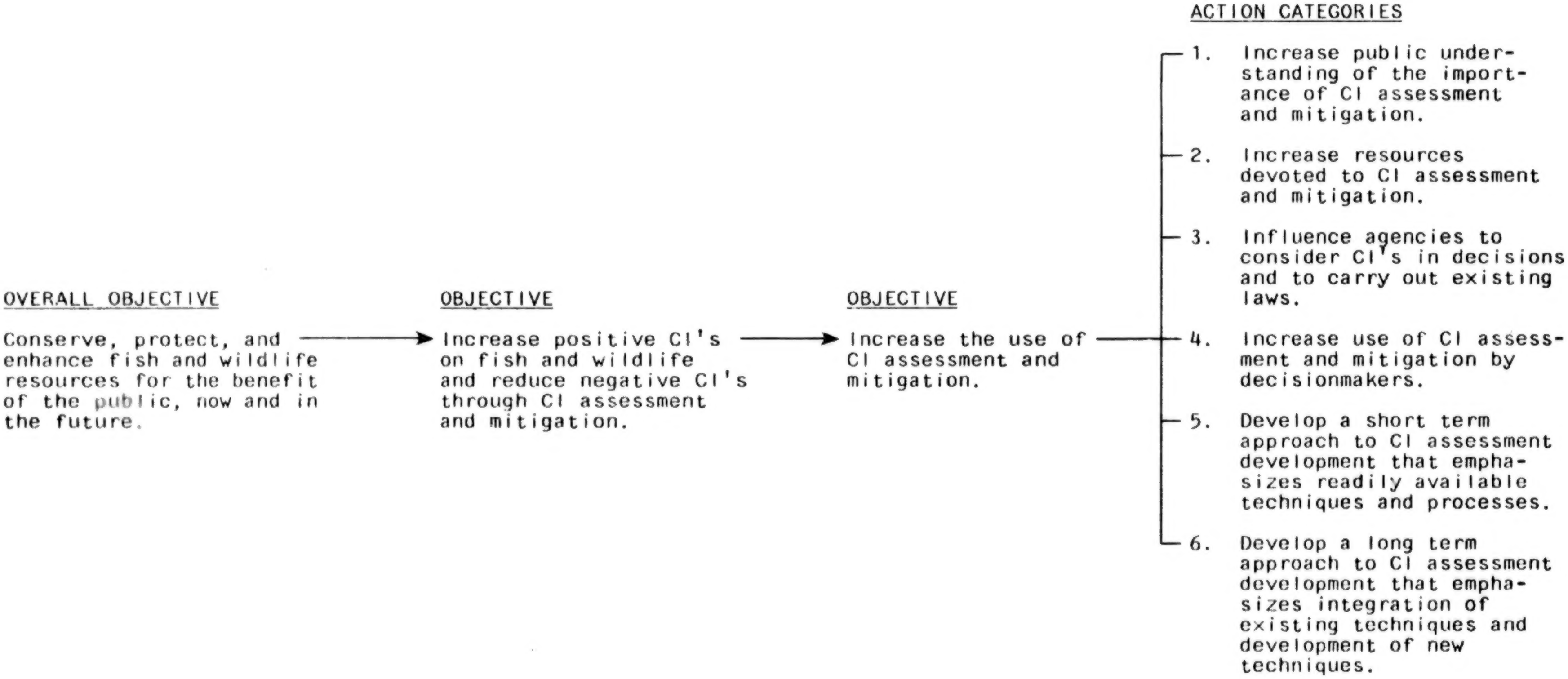
CATEGORY 3 OF PROBLEM CAUSES

Quantification and communication of CI's is occurring but the information is not significantly affecting resource decisions.

SPECIFIC PROBLEM CAUSES

- Existing laws regarding CI's have not yet been sufficiently interpreted by the courts and there is insufficient pressure to create new legislation or broadly interpret existing legislation.
- The unaided human mind is unable to handle the complexity and interrelationships of economic and ecological systems.
- There is no strong public demand to mitigate for CI's because the benefits of mitigation have not been evaluated and understood.
- The responsibility and authority of agencies to reduce adverse CI's on fish and wildlife resources is fragmented and uncoordinated.
- Inclusion of CI assessment would complicate the resource decisionmaking process.
- Decisionmakers frequently optimize other objectives without emphasizing fish and wildlife resource constraints.
- Mitigation of CI's is perceived as too costly.
- Agencies are not aware of the significance of CI's on fish and wildlife resources.
- Insufficient resources are devoted to influencing decisions regarding CI's on fish and wildlife resources.

Figure 4. Specific problem causes that comprise category 3 of problem causes. The order of listing is not the order of priority.



OVERALL OBJECTIVE

Conserve, protect, and enhance fish and wildlife resources for the benefit of the public, now and in the future.

OBJECTIVE

Increase positive CI's on fish and wildlife and reduce negative CI's through CI assessment and mitigation.

OBJECTIVE

Increase the use of CI assessment and mitigation.

ACTION CATEGORIES

1. Increase public understanding of the importance of CI assessment and mitigation.
2. Increase resources devoted to CI assessment and mitigation.
3. Influence agencies to consider CI's in decisions and to carry out existing laws.
4. Increase use of CI assessment and mitigation by decisionmakers.
5. Develop a short term approach to CI assessment development that emphasizes readily available techniques and processes.
6. Develop a long term approach to CI assessment development that emphasizes integration of existing techniques and development of new techniques.

Figure 5. Overall objective of CI assessment and the six major action categories to achieve the objective. The order of listing is not the order of priority.

ACTION CATEGORY 1

Increase public understanding of the importance of CI assessment and mitigation.

ACTION ITEMS

- Initiate a training program for non-FWS individuals that focuses on understanding and scoping CI assessment and mitigation.
- Organize and sponsor CI sessions at professional meetings.
- Publish overview papers on the importance of CI's to increase public awareness and scientific involvement.
- Publish papers and newsletter on court decisions, CI status, field applications, etc.
- Design a comprehensive multimedia public awareness campaign/program.
- Write effective news releases alerting the public to CI's and their relationships to fish and wildife values.
- Promote tax incentives for mitigation.
- Establish a CI advisory panel composed of a broad-based group of representatives from public and private interests who have a sincere interest in CI's and related decisions.
- Make presentations to local interest groups regarding projected losses due to CI's.
- Prepare model resource use permit process for CI's.

Figure 6. Action items that address action category 1 requirements. The order of listing is not the order of priority.

ACTION CATEGORY 2

Increase institutional resources devoted to CI assessment and mitigation.

ACTION ITEMS

- Advocate use of CI assessment by the FWS and other agencies.
- Develop and submit budgetary documents for CI assessment, development, and applications.
- Make CI assessments a high priority.
- Develop a network and interinstitutional coalitions for interest in CI assessment and mitigation.
- Conduct a public awareness program.
- Analyze relative merits of assessing and mitigating CI's as compared to impacts from individual projects.
- Enable managers to evaluate whether it would be more effective to spend resources on CI assessment and mitigation instead of on individual project assessments.
- Inform fish and wildlife special interest groups of the importance of CI's and the need for funding for CI assessments.

Figure 7. Action items that address action category 2 requirements. The order of listing is not the order of priority.

ACTION CATEGORY 3

Influence agencies to consider CI's in decisions and to carry out existing laws regarding CI's.

ACTION ITEMS

- Initiate a court suit that sets a precedent for enforcing assessment and mitigation for CI's.
- Seek new interpretations and regulations from existing laws by courts and agencies, respectively.
- Seek new laws, regulations, and policies regarding CI's.
- Document the lack of attention to CI's by Federal agencies.
- Form a coalition for legal research and subsequent actions regarding CI's.
- Determine why CI's aren't being assessed and mitigated by affected agencies and groups.
- Conduct legal and institutional analyses of agency roles and actions associated with CI's.

Figure 8. Action items that address action category 3 requirements. The order of listing is not the order of priority.

ACTION CATEGORY 4

Increase use of CI assessment and mitigation by decisionmakers.

ACTION ITEMS

- Provide an optimization capability for resource development while minimizing negative CI's on fish and wildlife.
- Provide forums for communication regarding CI's for particular areas among institutions (agencies, interest groups, and disciplines).
- Recommend effective and innovative mitigation measures to alleviate adverse CI's.
- Provide timely and relevant information to decisionmakers regarding potential CI's from pending actions.
- Conduct executive interagency (managerial) training on CI assessment and mitigation.
- Document case histories that include the costs and benefits of assessing and mitigating CI's vs. the costs and benefits of ignoring CI's.
- Determine the factors that influence decisionmakers (information needs, pressure points, constituencies, responsibilities, authority, technical resources, funding, etc.).
- Provide assistance with CI assessment and mitigation that includes: effective and simple information packaging; increasing access to decisionmakers; identification of appropriate decisionmaker, of units of measurement relevant to decisions, and decision entry points; and effective negotiation and communication skills and techniques.

Figure 9. Action items that address action category 4 requirements. The order of listing is not the order of priority.

ACTION CATEGORY 5

Develop a short term approach to CI assessment development that emphasizes available techniques and processes.

ACTION ITEMS

- Develop and describe a process for CI problem definition, causal analysis, and action identification and prioritization.
- Develop a process for field users to: determine if an environmental action would result in CI's; evaluate if an environmental impact analysis should be performed; and design an approach for conducting the analysis, including identification of data needs, decision entry points, and effective ways to use CI information.
- Conduct a comparative evaluation of existing CI assessment methods for potential users.
- Develop CI assessment guidelines that utilize existing techniques and information.
- Develop CI assessment case histories with examples of successful projects.
- Develop a process to determine which methods are most appropriate for a particular CI application.
- Conduct prototype applications of CI assessment to enhance understanding of needs, problems, solutions, and processes.
- Conduct workshops for the FWS and other field users to learn specific needs for CI assessment.
- Develop and apply criteria to evaluate existing tools, minimum data requirements, and technology development needs.

Figure 10. Action items that address action category 5 requirements. The order of listing is not the order of priority.

ACTION CATEGORY 6

Develop a long term approach to CI assessment development that emphasizes integration of existing techniques and development of new techniques.

ACTION ITEMS

- Advocate the concept of CI assessment and mitigation to other agencies and solicit their participation in an interagency approach to development of processes and technology.
- Integrate CI assessment methods into a central system capability.
- Develop new techniques as needs are identified.
- Provide technical assistance for special applications.
- Provide sensitivity analyses that distinguish critical and nonessential data. Identify methods for obtaining alternative information when critical data are not available.
- Provide a clearinghouse for identification, examination, and simplification of CI assessment and mitigation methods and processes.
- Develop a service center group to assist and train field users in applying CI assessments to meet their objectives.
- Monitor actions to determine the effectiveness of assessment and mitigation, and to improve CI assessment processes.

Figure 11. Action items that address action category 6 requirements. The order of listing is not the order of priority.

APPENDIX A. USE OF BACKSTEP ANALYSIS AND FUNCTIONAL ANALYSIS SYSTEM TECHNIQUE (FAST) DIAGRAMMING FOR PROGRAM PLANNING AND ANALYSIS.

One of the major problems confronted by specialists responsible for CI assessment is the organization of information for the analytical process. This is a formidable problem because the array of factors contributing to CI's are usually complex and correspondingly difficult to deal with. This appendix describes a process that enables a small group of specialists (four to six is the recommended number) to analyze a problem and to generate actions for solving the problem. The process is taught in an Office of Personnel Management, Denver Training Center course entitled "Workshop in Program Planning and Analysis." The process was designed to improve the planning and effectiveness of government programs. A program is defined as an organized set of activities designed to produce a particular result or set of results that will have a particular impact on a problem. Program planning and analysis is that portion of program management which includes needs assessment/problem formulation, goal and objective setting, generation of actions for solving the problem, analysis of those actions, decisions regarding actions to be taken, and planning for implementation of the program. We deal here with only two parts of program planning and analysis: needs assessment/problem formulation and generation of actions for solving the problem (Table A-1).

The approach used at the August 1984 CI workshop depends on an analysis of the complex factors causing a problem and the consequences if the problem is not corrected. The analysis provides information which is used to scope a holistic program for solving the problem. This approach to program planning and analysis promotes a broad, improved understanding of the problem, identification of cause-effect relationships, and collaboration among appropriate groups for solving the problem (Table A-2).

Needs assessment/problem formulation is a frequently neglected, sometimes forgotten and often superficial step in program planning and analysis. There are a number of techniques that may be used to facilitate needs assessment/problem formulation including: the nominal group technique; problem listing; backstep analysis; public hearings; survey techniques; and analysis of existing statistics.

The first step in the approach used for the workshop consists of a group agreeing on a problem statement, e.g., cumulative impacts are occurring that have a significant adverse effect on fish and wildlife resources (Table A-1). In Step 2, backstep analysis is applied to analyze causes and effects of the problem. Backstep analysis provides the planner with the detailed relationships between a problem as stated and its associated causes and consequences in a diagrammatic format (Fig. A-1). When the backstep analysis is performed, a stepdown process beginning with the problem statement is used to differentiate causes and consequences to a level where the answers become so vague or global as to be useless, or you run out of answers. For each juncture in a causal pathway the question "What are the causes?" is asked. For example, what are the causes of CI's seriously impacting fish and wildlife resources?

Table A-1. Process used to plan a tentative cumulative impacts program.

---

1. Develop a concise problem statement.

2. Define problem causes and consequences by performing backstep analysis.

3. Identify categories of problem causes and specific problem causes. Diagram the results as: (1) problem; (2) categories of problem causes; and (3) specific problem causes.

4. Designate actions that could be taken within each category to solve the overall problem by performing FAST diagramming.

5. Aggregate action items into action categories. Diagram the results as: (1) overall objective; (2) action categories; and (3) action items.

6. Improve the list of action items based on user needs assessment and establish priorities for action items using relative values provided by FWS users. Results of the first CI workshop have been used in other workshops to further plan a CI assessment program (January 1985 CI workshop and March 1985 Ecological Services Field Supervisor's Conference).

Table A-2. Features of the planning and analysis process applied to scoping a tentative cumulative impacts program.

Steps from Table A-1	Advantages	Potential disadvantages avoided
Problem cause analysis (Step 2).	Participation of individuals with broad backgrounds promotes improved understanding of a problem and contributes to improved planning and innovative problem-solving approaches.	When thorough problem analysis is avoided, symptoms instead of causes may be treated. There is no good basis for scoping a holistic, effective approach for solving the problem without it.
Action item analysis (Step 4).	After problem causes are identified, specific actions are scoped that fit in the overall problem solving approach.	When this step is omitted, scoping of a program can be based on narrow and unrelated elements, resulting in actions that are peripherally related to solving the problem. Poor coordination, overlap of activities, and unnecessary costs can collectively cause inefficiency or failure of a program.
Action item aggregation (Step 5).	There is no simple unilateral solution for most complex problems. If an agency cannot tackle problems in certain categories because of mission limitations, insufficient resources, etc., the information can be shared with appropriate groups to promote a collaborative approach to solving the problem.	If actions are not aggregated, it is difficult to prioritize tasks and to identify the best options.

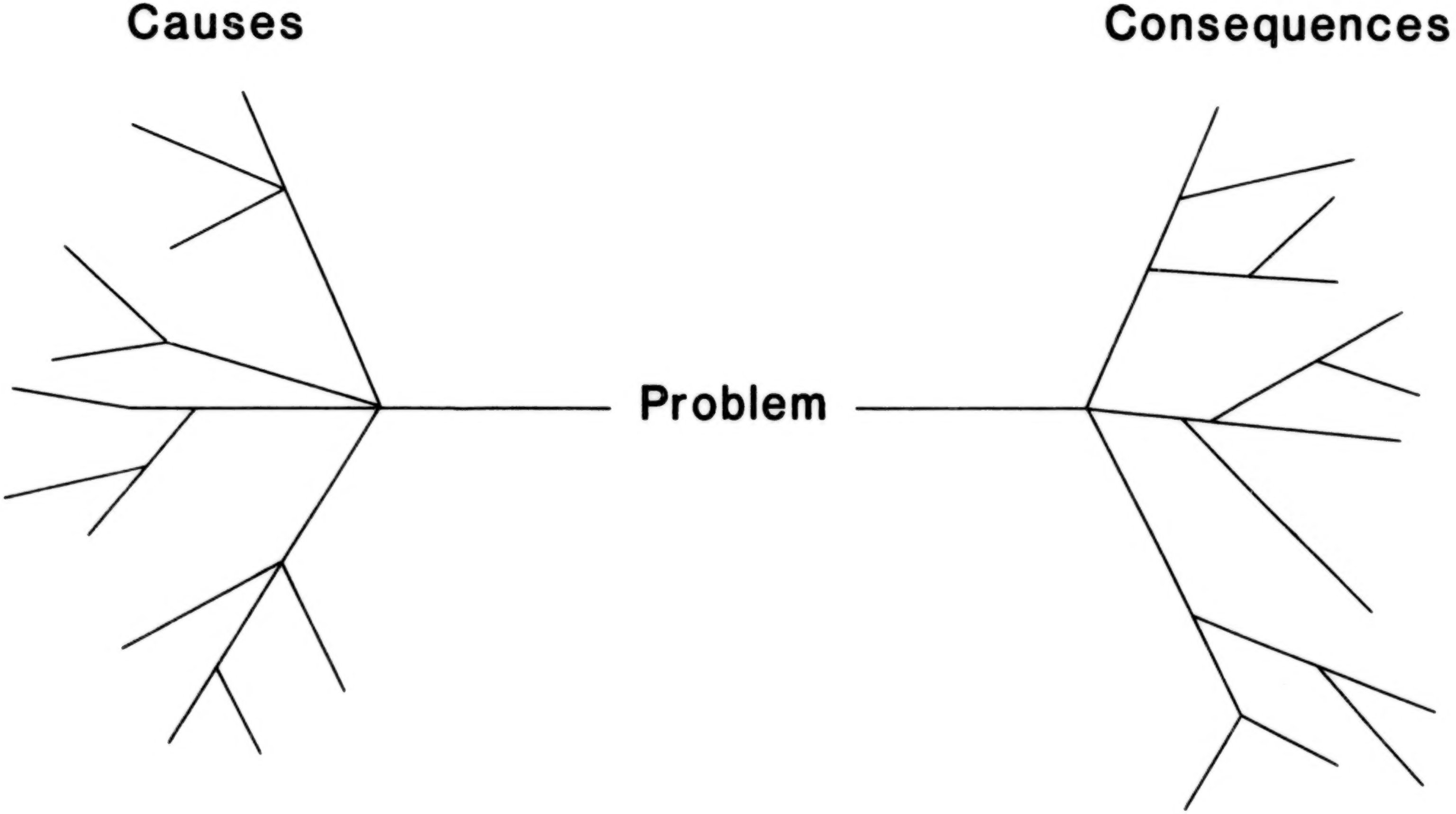


Figure A-1. Tree diagram configuration for a hypothetical backstep analysis. Branch ends represent the points at which additional reduction is infeasible or unnecessary. When an analysis is performed, chains connect at some points and there can be convergence from one chain to another.

One cause is state-of-the-art limitations in evaluating the impacts. What are the causes of this? One answer - proven assessment methods are unavailable. What are the causes of this? Answers - methods are not developed; methods exist but users don't know about them; methods are not simplified for field use; etc. What are the causes of these factors? One answer - there is no National priority for a cumulative impacts program that provides useful technology to field users.

Because of the complicated nature of cause-effect relationships, there are pathway connections at intermediate points in a chain and a terminal point can affect more than one pathway (Fig. A-1). If the chain can be influenced by eliminating or diminishing the effect of any cause, its contribution to the overall problem will be affected. After an analysis of problem causes, consequences are delineated to gain a better perspective of the problem. Causes of the overall problem are then categorized to simplify scoping of actions to solve the problem (Step 3).

Step 4 in our program planning and analysis approach is the generation of action items. This can be accomplished by querying others for their experience, brainstorming, functional analysis system technique (FAST) diagramming, and the nominal group technique. We chose to use FAST diagramming because both backstep analysis and FAST are cause-effect diagrams. FAST diagrams lay out cause-effect proposals for dealing with the problem. FAST is described as a tool that will significantly alleviate the time problem of program managers and planners and will increase the quality of program plans.

In FAST diagramming, the stepdown approach is taken for each problem category to develop the logic for discrete actions that can be taken to influence decisions and solve problems. In FAST diagramming, at each step to the right the question - how? is asked and compared to the question - why? for each step to the left (Fig. A-2). The question, "How can we lessen adverse cumulative impacts on fish and wildlife resources?" is answered by: effectively influence decisions of decisionmakers. The question, "Why effectively influence decisions of decisionmakers?" is answered by: lessen adverse cumulative impacts on fish and wildlife resources.

As a result of completing a FAST diagram, logical action items are identified. For example, one action might be to determine the information needs of decisionmakers and effective ways to present the information. Other items could be identified from branch points in the chain such as an action to evaluate existing technology for possible application. After the analysis is completed, action items are aggregated into action categories to improve comprehension (Step 5). The final process step we adopted for the August 1984 workshop was to plan future review and improvement of the tentative program plan by users of CI assessment technology inside the FWS Habitat Resources Program (Step 6).

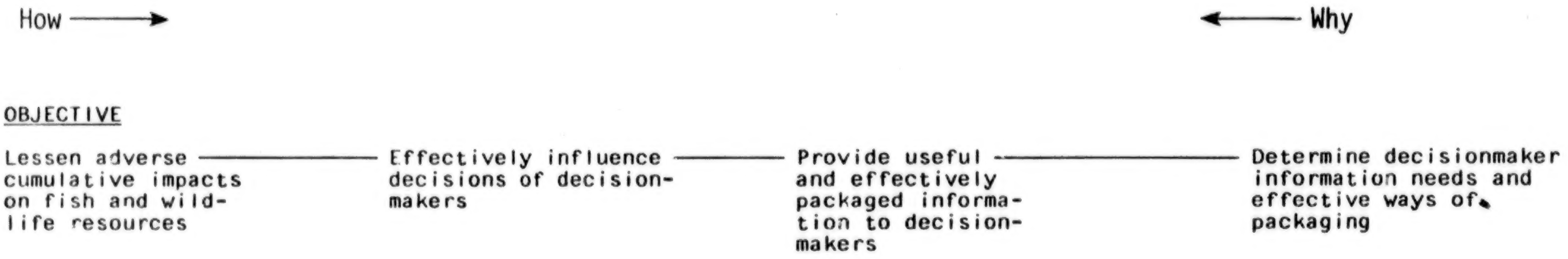

How →
← Why
OBJECTIVE
Lessen adverse cumulative impacts on fish and wildlife resources
Effectively influence decisions of decisionmakers
Provide useful and effectively packaged information to decisionmakers
Determine decisionmaker information needs and effective ways of packaging

Figure A-2. Simplified example of results of FAST diagramming to develop logic for defining action items for a category of problems. Ask the question "How?" as you progress from left to right and ask the question "Why?" as you progress from right to left in the diagram.

The process described in this appendix was used to develop a tentative FWS program for CI assessment, but it is also one of several program planning and analysis approaches that could be applied to a specific CI problem. For a specific problem (e.g., CI's of activities in the Chesapeake Bay that adversely impact striped bass), the steps could be to: (1) use backstep analysis to analyze causes and consequences of the problem; and (2) use FAST diagramming to identify actions to correct the problem, including mitigation and enhancement.

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U.S. Department of the Interior, Washington, DC 20240

13. Type of Report & Period Covered

14.

15. Supplementary Notes
The Biological Report series was initiated in October 1984 to replace the FWS/OBS series published since 1976.

16. Abstract (Limit: 200 words)

This report presents the results of a U.S. Fish and Wildlife Service cumulative impacts (CI) assessment workshop. Workshop participants analyzed CI problems and discussed possible actions for dealing with impacts affecting fish and wildlife resources. Backstep analysis was used to analyze causes and consequences of CI problems. The functional analysis systems technique (FAST) was used to identify specific actions that could be taken to solve the problems.

Actions for increasing the use of CI assessment and mitigation were categorized as: 1) increasing public understanding; 2) increasing resources devoted to CI assessment and mitigation; 3) influencing agencies to consider CI's; 4) increasing use of CI assessment by decisionmakers; 5) assembling readily available techniques and processes for CI assessment; and 6) developing new technology while integrating existing CI assessment techniques. Fifty specific actions for the six categories of action items were identified.

17. Document Analysis a. Descriptors
Natural resources
Meetings

b. Identifiers/Open-Ended Terms
Cumulative impacts
Mitigation
Impact assessment
Workshop
Functional analysis systems technique
Backstep analysis

c. COSATI Field/Group

18. Availability Statement
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21

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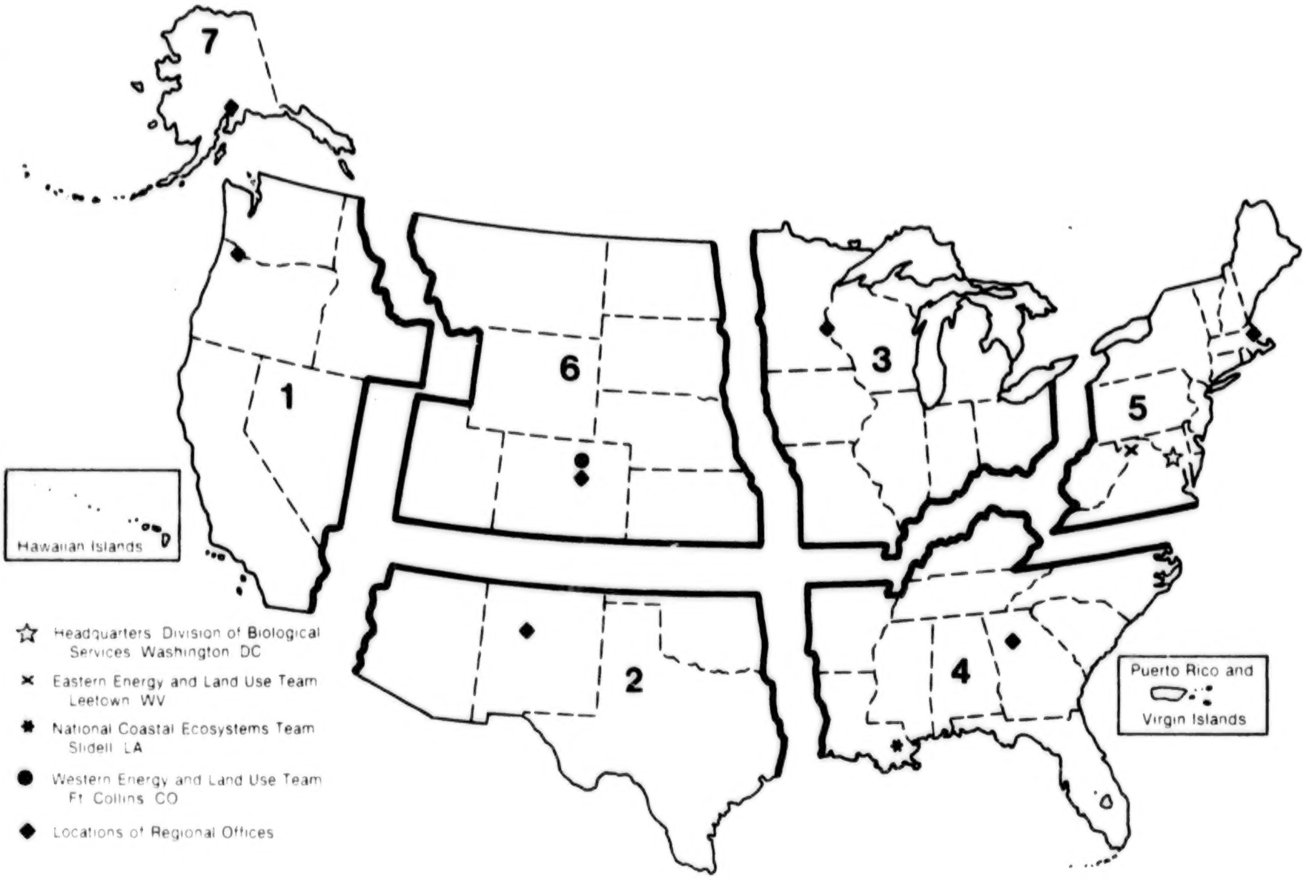
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Hawaiian Islands
Puerto Rico and Virgin Islands
☆ Headquarters, Division of Biological Services, Washington, DC
× Eastern Energy and Land Use Team, Leetown, WV
✱ National Coastal Ecosystems Team, Slidell, LA
● Western Energy and Land Use Team, Ft. Collins, CO
◆ Locations of Regional Offices

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DEPARTMENT OF THE INTERIOR

U.S. FISH AND WILDLIFE SERVICE

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

END

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